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## First record of the genus *Sminthurinus* (Collembola: Katiannidae) from Chile with description of a new species

### Primer registro del género *Sminthurinus* (Collembola: Katiannidae) de Chile con descripción de una nueva especie

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#### ABSTRACT

A new species of *Sminthurinus* is described and illustrated. The new species is unique because it has four small spines in posterior part of the head and 6-7 tenent hairs on each tibiotarsus. A key for the identification of the Central and South American species of the genus is also provided.

**Key words:** *Sminthurinus*, taxonomy, South America.

#### RESUMEN

Se describe e ilustra una nueva especie de *Sminthurinus*, que se caracteriza por la presencia de cuatro pequeñas espinas en la parte posterior de la cabeza y 6-7 tenent hairs en cada tibiotarso. Además, se proporciona una clave de identificación para las especies del género en Centro y Sudamérica.

**Palabras clave:** *Sminthurinus*, taxonomía, Sudamérica.

Members of Katiannidae are very colorful and small globular springtails. Most of body segments are fused, three tagmata can be distinguished, head, great abdomen (from Thorax I to Abdomen IV) with three pairs of trichobotria with a triangular patten, and a lesser abdomen (Abdominal segments V and VI) with one pair of trichobotria. Metatrochanter of legs with a clear trochanteral organ. Tenaculum with 3 teeth and a one basal appendix on each ramus and a corpus tenaculum with 0-2 setae. The family has 209 species valid in 19 formally described genera (Bellinger, et al. 2017), but in the Neotropical Region there are present only five genera: *Arborianna*, *Katianna*, *Katiannellina*, *Stenognathellus* and *Sminthurinus*. *Polykatianna intermedia* Snider, 1978 was cited in corn fields from Chiapas by Mendoza Arviso et al. (1999) but never has been confirmed.

*Sminthurinus* is cosmopolitan, with 89 species known from all over the world. They usually have very bright or strong colors and are tinny animals living mainly in soil and litter but also in epiphytic plants such as moss and Bromeliaceae genus *Tillandsia* (Palacios-Vargas, 1981; Palacios-Vargas et al., 2012). Sixteen species have been described from Central and South America, but none from Chile. From Costa Rica two species were described by (Denis, 1933), one species from Brazil (Arlé, 1940) and the others from Argentina (Börner, 1907; Delamare-Deboutteville and Massoud, 1963; Najt, 1969; Najt, 1971; Najt, 1973; Najt and Rapoport, 1965).

Abbreviations used in the description are: Ant. = Antennal segment; Abd. = Abdominal segment; Th. = Thoracic segment.

#### Diagnoses of *Sminthurinus* modified from Bretfeld, 1999

Body globular. Head with thin, small normal setae and chewing mouthparts; antenna longer than head; Ant. IV undivided, at least two times longer than Ant. III; Ant. III with papilla simple or with 2-4 vesicles; male without hump on Th. II – III; tibiotarsi usually with 2-7 capitate tenent hairs; unguis with or without pseudonychia and tunica; setae of large abdomen simple, full set of bothriotricha present (A,B,C) in an triangle on great abdomen, and one pair of bothriotricha on lesser abdomen (D); sacs of ventral tube smooth; tenacular rami with 3 teeth and a basal appendix, corpus tenaculum with 0, 1 or 2 setae. Metatoracic legs with a trochanteral organ. Dens with ventral chaetotaxy reduced, mucro without seta. Abd. VI in females with one furcated seta and three lateral pairs of wide winged setae on the supranal valve and three less winged setae on each lateral anal valve; neosminthuroid setae present; subanal appendix of female hooked of palmate.

*Sminthurinus* Börner, 1901

**Syn.:** *Sminthurus* Schött, 1891 partim

**Syn.:** *Smynthurus* Folsom, 1896 partim

**Syn.:** *Eusminthurus* Börner partim

**Syn.:** *Smynturella* Houlbert, 1924

**Syn.:** *Metakatianna* Gisin, 1960

**Syn.:** *Stenognathellus* Gisin, 1960

**Syn.:** *Stenognathellus* Richards, 1968

Type species: *Sminthurus niger* Lubbock, 1898

## MATERIAL AND METHODS

The description of the new species is based on material from the collection of the Muséum d'histoire naturelle de Genève, cited as *Sminthurinus* (Palacios-Vargas, et al., 2013). The specimens were first cleared in 10% KOH, then heated in lactophenol and mounted on microscopic slides in Hoyer's solution. Drawings were done with a Carl Zeiss contrast microscope, using a drawing tube. Measurements were taken from one adult holotype and 2 adult paratype specimens.

## RESULTS

### *Sminthurinus harryius* sp. nov.

(Fig. 1-9)

<http://zoobank.org/092917B5-9FA1-457C-B092-311CD6B8C379>

**Description.** Length of body: 590-620 µm; head 247-296 µm. Color dark purple with a pattern of several circular or elliptical white patches on head (Fig. 1) very constant, eyes patches black. Pores and oval organs uncertain. Posterior part of head lighter. Ant. I and II very dark, III and IV lighter. Body very dark purple with a regular pattern of circular or elliptical white patches, and four constant bands almost white, two on Th. I, one on Th. II and III, and one between the greater abdomen and lesser abdomen. Legs and furcula paler than body. Body globular; Abd. V distinctly separate from furcal and anal segment. Cuticle finely granulated, except on posterior part of head where is stronger than other parts. Head clothed with few short and fine smooth setae, except the top of head where there are four small spines (Fig. 2). Three trichobothria (A-C) on each side of greater abdomen, arranged not in the same line, anterior one (A) is placed on a papilla base in crater-like small deepening (Fig. 5). Lesser abdomen with trichobothria D.

Antennae about 1.2- 1.4 times longer than the diameter of the head. The relative lengths of Ant. I: II; III; IV are as 1: 2.4; 2.9; 7.5 (Fig. 3). Ant. I-III with short fine setae, not longer than the width of segments. Ant. I with 5 setae, Ant. II with three whorls with one, four and seven setae. Ant. III in middle part with a papilla subdivided into four vesicles. Sensory organ placed in distal part of this segment consists of two short sense rods. Ant. IV is simple without subdivisions, but with 10-11 irregular whorls of setae and no apical bulb.

Mandible well developed, with molar-plate and apically with five teeth. Head of maxilla approximately globular with teeth and six sort lamellae. Eight eyes on each side of the head of which the central inner one is smaller than the others.

Tibiotarsi I-III with 6-7 tenent hairs (Fig. 4). Ungues moderately long with one small inner tooth and a smaller one on the apex; dorsally with a small pseudonychia which seems as a row of tinny teeth, a week tunica is present. Empodial appendage the fore foot has narrow, elongated lamellate, a distinct corner-tooth and long subapical

filament which extends to the tip of the unguis, on other appendages it is shorter than the unguis (Fig. 4).

Tenaculum with two apical setae on corpus, tridentate rami, and one small appendage at the base of each rami (Fig. 6). Neosminthuroid seta longer than adjacent setae (Fig. 5). Furcula well developed. Manubrio with nine pairs of setae. Ratio manubrium: dens; mucro as 1: 1; 0.55. Dentes furnished with five setae on the external side, six on the lateral side and three short ventro-distal setae (Fig. 7); ventrally one seta near the basis of the dens, and three subproximal, ventral formula: 3 ... 1. Dens about 2.2 the length of mucro, which is serrated in both sides, but more densely the outer part. Mucronal seta absent.

Subanal appendage of female palmate, thick, about 3/4 the length of mucro, with 7-9 branches (Fig. 8). 5 + 5 pregenital small setae. Anal valves of females with long setae basally broadened wing-like in the adult females (Fig. 9) and also some short and thin setae. Seta C1 inserted medially on the upper valve is deeply split in two branches (Figs. 8, 9). Males not seen.

**Variation.** 5-7 tenent hairs on each tibiotarsi in some specimens, the Ant. III papilla seems to have 3 or 4 vesicles depending on the position.

**Type material:** Holotype female, and two juvenile paratypes will be sent to the Museum of Natural History of Geneva, four slides of undetermined sex of this species were left on September 20, 2010 at this museum. Two female paratypes, and 3 juveniles paratypes will be kept at author's institution.

**Type locality:** Chile: X Region. Province of Chiloé, Parque Nacional de Chiloé, Rancho Grande, near Cuaco, 42° 33' S, 74° 02', 300-600 m; open mixed *Fitzroya cupressoides* Forest. 4-I-1991; ex sifting of vegetation debris and moss; Donati Gosti et Daniel Burckhardt cols. Sample # 30 a.

**Derivatio nominis:** This new species is named after Dr. Harry Braylovsky, for his contribution on the taxonomy of Hemipterans.

## DISCUSSION

Most distinctive diagnosis character of *Sminthurinus harryius* sp. nov. is the presence of four small conical spines on posterior part of the head, unique in the genus, and the combination of papilla of the Ant. III divided in four vesicles; presence of a small tunica and a well-developed pseudonychia on unguis; two edges of mucro toothed, no subapical setae on ventral dens and the 6-7 tenent hairs on each tibiotarsus. The new species resembles *S. tucumanensis* Delamare Deboutteville et Massoud, 1963 from Argentina, because both species have 4 vesicles in papilla of Ant. III, and have two strong serrate edges on mucro, but the last species have only 4,4,3 tenent hairs (*versus* 7,7,6,) and it also has a more abundant chaetotaxy on dens (20 vs 18 setae). The new species is clearly distinguished of the other species from Central and South America of the genera as is shown in table 1.

Many species in the genus were insufficiently described, often the data on measurements, apical bulb on Ant. IV, vesicles of Ant. III papilla, genital segment, shape of subanal appendages presence of unguis and uguiculus teeth, pseudonychia, tunica and corpus tenaculum setae were not mentioned (Table 1).

### ACKNOWLEDGMENTS

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### Key to the species of *Sminthurinus* from South America\*

1. Head only with small setae, tibiotarsi with less than 6 tenent hairs ..... 2
  - 1'. Head with four small posterior spines besides the regular setae, tibiotarsi with 6-7 tenent hairs ..... *S. harryius* sp. nov. Chile
  2. Tibiotarsi without capitate tenent hairs ..... 3
  - 2'. Tibiotarsi with several capitate tenent hairs ..... 4
  3. Mucronal edges weak toothed, 18 setae on dens, head with one tubercle close to each eye patch .... *S. tuberculatus* Delamare-Debouteville et Massoud, 1963 Argentina
  - 3'. Mucronal edges smooth, 15 setae on dens, head without tubercles ..... *S. antennalis* Rapoport, 1962 Argentina
  4. Both mucronal edges smooth ..... 5
  - 4'. One or both mucronal edges toothed ..... 7
  5. Dens with 23 setae, big species (2.4 mm), tibiotarsi with 3 tenenthairseach.....*S. australis* Najt, 1973 Argentina
  - 5'. Dens with 19 setae, small species (less than 1.4 mm), tibiotarsi with more tenent hairs ..... 6
  6. Very small species (0.7 mm), tibiotarsi with 4-5 tenent hairs each ..... *S. packardi* Denis, 1933 Costa Rica
  - 6'. Not so small species (1-1.2 mm), tibiotarsi with 4 tenent hairs each ..... *S. molinai* Arlé, 1940 Brazil
  7. Papilla of Ant. III tubercle with 4 vesicles...*S. tucumanensis* Delamare-Debouteville et Massoud, 1963 Argentina
  - 7'. Papilla of Ant. III tubercle with 1 vesicle ... 8
  8. Corpus of tenaculum with no seta ..... *S. bullai* Najt, 1973 Argentina
  - 8'. Corpus of tenaculum with 1 or 2 setae ..... 9
  9. Tibiotarsi with 5 tenent hairs each ..... 10
  - 9'. Tibiotarsi with 3 or 2 tenent hairs each ..... 12
  10. Dens with 23 setae ... *S. sayi* Denis, 1933 Costa Rica
  - 10'. Dens with 15 or 16 setae ..... 11
  11. One seta on corpus tenaculum, both edges of mucro serrate ..... *S. patagonicus* Najt, 1971 Argentina
  - 11'. Two setae on corpus tenaculum, one edge of mucro serrate ..... *S. operosus* Najt et Rapoport, 1965 Argentina
  12. Dens with 18 setae ..... 13
  - 12'. Dens with 13 setae ..... 14
  13. One mucronal edge toothed, tibiotarsi with 2,3,3 tenent hairs ..... *S. woringeri* Delamare-Debouteville et Massoud, 1963 Argentina
  - 13'. Both mucronal edges toothed, tibiotarsi with 3,3,2 tenent hairs ..... *S. nunezi* Delamare-Debouteville et Massoud, 1963 Argentina
  14. Corpus tenaculum with 2 setae ..... *S. insularis* Najt, 1973 Argentina
  - 14'. Corpus tenaculum with 1 seta ..... 15
  15. One mucronal edge toothed ..... *S. inexcussus* Najt et Rapoport, 1965 Argentina
  - 15'. Both mucronal edges toothed ..... *S. castagninoi* Najt, 1969 Argentina
- \* *S. mime* Börner, 1907 and *S. aureussetosus* Bretfeld, 2002 are not included because their descriptions are very brief.

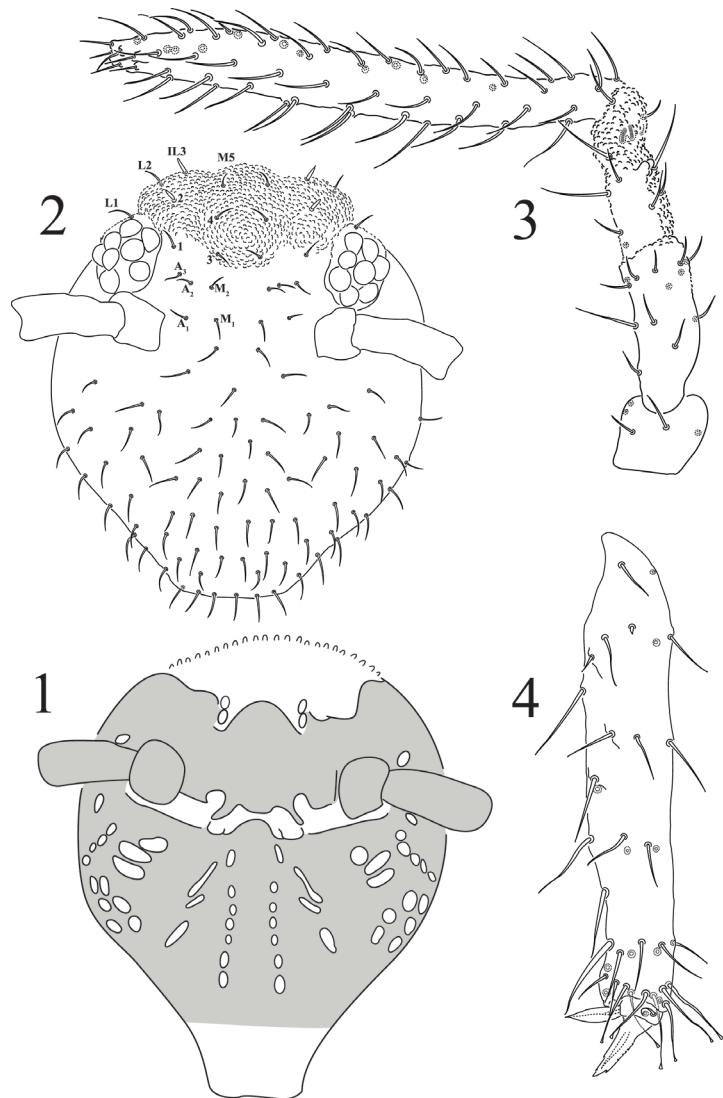
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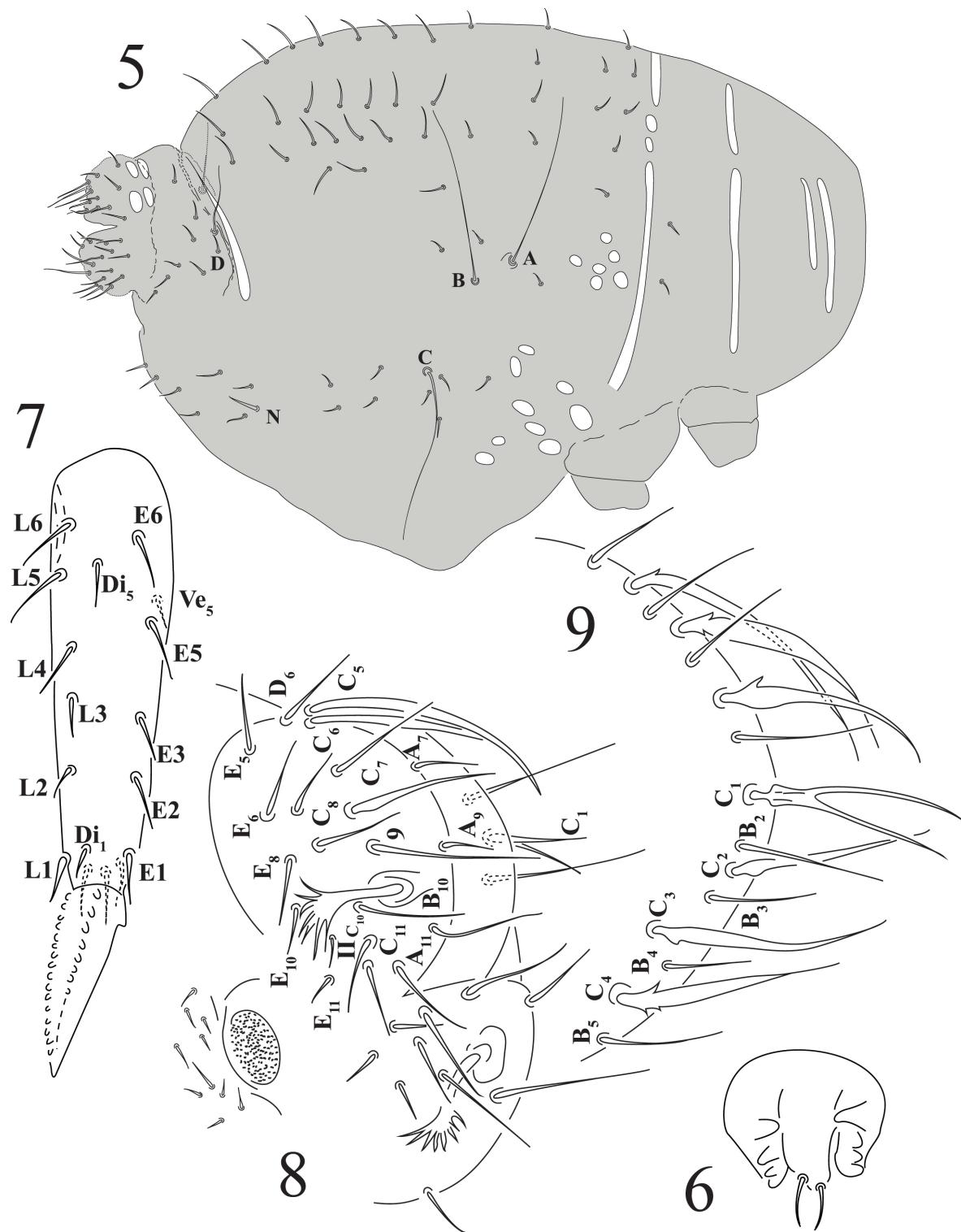
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Figures 1-4. *Sminthurinus harryius* sp. nov. 1, head color pattern distribution; 2, head chaetotaxy; 3, antennal segments I-IV; 4, tibiotarsus III. Legend to abbreviations of head chaetotaxy: A, anterior, IL, interno-lateral, L, lateral, M, medial.



Figures 5-9. *Sminthurinus harryius* sp. nov. 5, body color pattern and chaetotaxy in lateral view; 6, tenaculum; 7, dens chaetotaxy and mucro; 8, ventro-lateral view of anal segment of female; 9, upper anal valve of female in dorsal view. Legend to abbreviations of abdominal chaetotaxy A, B, C, D, bothriotricha; N, neosminthuroid seta).

TABLE I. COMPARISON OF SMINTHURINUS FROM CENTRAL AND SOUTH AMERICA

SPECIES	LENGTH mm	MUCRO EDGES SERRATE	PAPILLA ANT III (Ant. Ratio)	TENENT HAIRS	UNGUAL PSEUDONYCHIA	TUNICA	DENS	TENACULAR RAMI /SETAE	UNGUILAR TEETH	SUBANAL APPEND	BULB PALMATE
<i>antennalis</i>	0.31	0	1.0,0,0	?	?	?	?	15 (15?)	3	0	?
<i>aurensussetosus</i>	0.8	2	1:1.1:1.4:3	5,5,5,	?	?	+	15	2	3?	+
<i>australis</i>	2.4	0	1:1.8:2.5:4.6	3,3,3	+?	-?	-	23	3	1	+
<i>bullai</i>	1.0	0	1:1.8:2.5:6.9	2,3,3	?	-	-	?	3	0	+
<i>castagninoi</i>	0.71-0.82	2	1:1.7:2.1:5.7	3,3,3	?	?	-	?	3	1	?
<i>inxessus</i>	0.57-0.63	1	1	3,3,3	+?	+	-	13	3	1	+
<i>insularis</i>	0.81	1	1:1.7:2.4:6	3,3,3	?	?	-	13	3	2	?
<i>molinai</i>	1.0-1.2	0	1:1.9:2.6:6.2	4-5,4- 5,4-5	+	?	?	19	6	2	?
<i>nunezi</i>	1.0	2	1	3,3,2	+	+	+	18	6	1	+
<i>operosus</i>	1.3	1	*1:1.5:2:5	5,5,5	-	?	?	16	3	2	+
<i>packardi</i>	0.70	0	1:2:2:8.7:5	4,4,4	?	?	?	19	3	2	+
<i>patagonicus</i>	0.80	2	1:2:2:8:6.6	5,5,5	?	-	-	15	3	1	+
<i>sayi</i>	0.3-1.2	2	1:1.7:2:3.6	5,5,5	+	-	-	23	3	1-2	+
<i>tuberculatus</i>	?	2 week	1:2:1.7:2.5?	0,0,0	-	-	-	18*	3	?	+
<i>tucumanensis</i>	?	2 strong	4	4,4,3	-	-	-	20	3	?	+
<i>woringeri</i>	?	1	1	2,3,3	+	+	?	18	3	?	+
<i>harryi</i>	0.90	2	4	7,7,6	+	+	+	18	3	2	-

\* Four spines on each side.